

REMARKS

The application is believed to be in condition for allowance.

The claims have been amended responsive to the claim objections raised on page 2 of the Official Action. Withdrawal of the claim objections is therefore solicited.

There are no other formal matters outstanding.

Applicants appreciate the time and consideration provided by the Examiner in discussing this case.

Claims 22-23 are new and are supported by the two specification paragraphs beginning on page 11, line 15, and as illustrated by Figures 2-3. No new matter is entered by way of this amendment.

The claims stand rejected as anticipated by JP 6182518 (JP '518).

The independent claims have also been amended to clearly recite the invention's structural nature and thereby avoid the "JP '518 is capable of" basis of rejection, e.g., in claim 1 the recitation is now a single-phase AC current power supply connected to each coil and structurally configured to supply a single-phase AC current to each coil such that every pair of the electromagnets lying side by side next to each other have a phase difference of 0° or 180°. Claims 4 and 21 have been similarly amended.

No new matter is entered by way of these amendments. Attention is directed to Figures 2-3 and page 11, line 15 to page 12, line 7.

Now as rejected, there is required a single phase AC current power supply connected so that all the adjacent coils have phase differences of either 0 degrees or 180 degrees, supplied by a single-phase AC current.

Reference is made to MPEP 2111.0. This section alerts the Examiner that certain phrases may recite optional language. The section states that "Claim scope is not limited by claim language that suggests or makes optional but does not require steps to be performed, or by claim language that does not limit a claim to a particular structure. However, examples of claim language, although not exhaustive, that may raise a question as to the limiting effect of the language in a claim are: (A) "adapted to" or "adapted for" clauses; (B) "wherein" clauses; and (C) "whereby" clauses."

The section further states that "The determination of whether each of these clauses is a limitation in a claim depends on the specific facts of the case. In *Hoffer v. Microsoft Corp.*, 405 F.3d 1326, 1329, 74 USPQ2d 1481, 1483 (Fed. Cir. 2005), the court held that when a "'whereby' clause states a condition that is material to patentability, it cannot be ignored in order to change the substance of the invention." *Id.* However, the court noted (quoting *Minton v. Nat'l Ass'n of Securities Dealers, Inc.*,

336 F.3d 1373, 1381, 67 USPQ2d 1614, 1620 (Fed. Cir. 2003)) that a "'whereby clause in a method claim is not given weight when it simply expresses the intended result of a process step positively recited.'" Id."

The present claims do not recite optional features but rather recite a particular structure. The record in the present case makes this clear. Applicant has stated that the recitations are structural limitations. As provided by the MPEP 2111.04 guidance, these recitations cannot be ignored in order to change the substance of the invention.

Put simply, the claims recite a structure and the recitations must be given patentable weight, e.g., a single-phase AC current power supply connected to each coil and structurally configured to supply a single-phase AC current to each coil such that every pair of the electromagnets lying side by side next to each other have a phase difference of 0° or 180°.

As the prior art does not disclose any such structure, the claims are believed patentable.

JP '518 does not anticipate as JP '518 does not disclose a single phase AC current power supply connected so that all the adjacent coils have phase differences of either 0 degrees or 180 degrees, supplied by a single-phase AC current.

The Official Action acknowledges that JP '518 discloses a three phase power supply and that the power supply is disclosed as providing three phase AC current power to the coils.

Should the rejection not be withdrawn, applicants respectfully request the next Official Action provide a specific finding of fact stating that JP '518 discloses a three phase power supply and that the power supply is disclosed as providing three phase AC current power to the coils.

The Official Action states that the three-phase current of JP '518 is capable of generating a single phase by using only one pair of poles and not using the other two pair of poles. This may be accurate; however, this is an admission that JP '518 does not disclose a single-phase AC current power supply connected so that all the adjacent coils have phase differences of either 0 degrees or 180 degrees, supplied by a single-phase AC current.

On page 4 of the Official Action, it is stated that JP '518's core is arranged the same way as applicants' invention, the phase difference would inherently be of 0 or 180 degrees. This statement is not correct. Does the Official Action mean that JP '518 could be reconfigured to provide the recited structure? If so, this is an admission the claims are not anticipated.

Reference is made to the illustrations provided in the amendment of January 25, 2007.

Illustrations 1-6 were provided to explain why the JP '518 device cannot provide a single-phase AC current to each coil.

Illustrations 1 and 2 show the arrangement of the phase of each coil attached to each excitation circuit (41 to 59) realized in the apparatus shown in Drawings 3 and 5 of JP '518. This illustrates show that the phase difference of all the adjacent coils is NOT either 0 degrees or 180 degrees.

In the January 25, 2007 amendment, it was explained that function generators 81 to 86 give energization duty data for sine wave current, the phase of which is decided by synchronization pulses Pb0, Pb120, Pb240, Pb180, Pb60 and Pb300, respectively (see [0018] to [0023]).

For example, function generator 81 provides duty data of phase  $0^{\circ}$  to energization pulse generators 61, 64 and 67, that provides sine wave current of phase  $0^{\circ}$  to excitation circuits 41, 44 and 47, respectively (Illustration 1). Similarly, function generator 82 provides duty data of phase  $120^{\circ}$  (i.e. having phase difference of  $120^{\circ}$  with sine wave current generated according to the function generator 81) because of the synchronization pulse Pb120 (Illustration 2), to energization pulse generators 62, 65 and 68, that provides sine wave current of phase  $120^{\circ}$  to excitation circuits 42, 45 and 48, respectively (Illustration 1). Similarly, function generators 83, 84, 85 and 86 in result provides sine wave current of phase  $240^{\circ}$ ,  $180^{\circ}$ ,  $60^{\circ}$  and  $300^{\circ}$ , respectively.

Illustration 3 shows that the arrangement of phase of coils shown in Figure 2 in the present application cannot be

realized by the power supply shown in Drawings 3 and 5 in JP '518. Excitation circuits 41 and 44 are connected to energization pulse generators 61 and 64, respectively. Both of the energization pulse generators 61 and 64 are connected to the same function generator (i.e. 81), and therefore must have the same phase. At the same time, the phase created by the excitation circuits 41 must be  $0^\circ$  and the phase created by the excitation circuits 44 must be  $180^\circ$ . In conclusion, the same function generator 81 must create function for  $0^\circ$  and  $180^\circ$  at the same time, which is impossible.

Illustration 4 shows an example of the modification to realize the phase arrangement of Figure 2, this application based on the apparatus of Drawings 3 and 5 of JP '518. Connections between function generators (81 to 86) and energization pulse generators 61 to 79 must be entirely changed. For example, in original Drawing 3 (or Illustration 1), function generator 81 is connected to excitation circuits 41, 44 and 47 via energization pulse generators 61, 64 and 67, respectively. Further, function generator 82 is connected to excitation circuits 42, 45 and 48 via energization pulse generators 62, 65 and 68, respectively. In Illustration 4, in contrast, function generator 81 is connected to excitation circuits 41, 43, 45, 47, 49, 51, 53, 55, 57 and 59 via energization pulse generators 61, 63, 65, 67, 59, 71, 73, 75, 77 and 79, and 64, respectively, and function

generator 82 is not connected to any energization pulse generators.

However, this only means that the power generator can be modified to provide single-phase AC current, and it does not mean that the power generator can provide single-phase AC current as it is. In other words, some change is necessary to realize the phase distribution shown in Figure 2.

Illustrations 5 and 6 show how the power supply in JP '518 can be modified to realize phase distribution of Figure 3 of this application. If synchronization pulses introduced in function generators 82 and 83 is replaced by  $Pb0^\circ$  and that introduced in 85 and 86 is replaced by  $Pb180^\circ$  as shown in Illustration 6, the arrangement of the phase in Figure 3 will be realized, without any change of the connections (Illustration 5). However, again, such modification requires the change in structure or programming of pulse generating circuit 90, or the change in the connections between pulse generating circuit 90 and function generators 82, 83, 85 and 86.

As is clear, JP '518 does not anticipate, and could not be made to anticipate without significant, non-obvious modifications.

Additionally, please note that no two electromagnets chosen from the same side of the mold in the apparatus of JP' 518, adjacent or not, have a phase difference of  $180^\circ$  (see Illustration 1 filed on January 25, 2007). Therefore, phase

differences of 180° cannot be realized "by not utilizing the other two pairs".

From the above, it is clear that JP '518 does not anticipate any of the independent claims.

The Official Action has not addressed the recitations of claims 17-21. Claim 17 and 18 recite wherein each pair of adjacent coils for single-phase AC current on the same side of the mold have phase differences of 0°, and claims 19-20 recite wherein each pair of adjacent coils for single-phase AC current on the same side of the mold have phase differences of 180°.

If the rejection of these claims is not withdrawn, applicants respectfully request the next Official Action provide a specific finding of fact stating that JP '518 discloses these features and identifying the supporting disclosure within JP '518.

Absent a showing that the features are disclosed, the anticipation rejection fails.

The invention as recited by new claims 22-23 is also believed patentable as the prior art does not teach or suggest the recited combination of features.

Although the prior art may teach electromagnets arranged in a facing relation on opposite sides of said mold along a transverse width thereof to lie side by side along a longitudinal width of said mold comprise i) at least a first electromagnet on a first of said sides, a second electromagnet



immediately adjacent the first electromagnet, and a third electromagnet immediately adjacent the second electromagnet, and ii) at least a fourth electromagnet on a second of said sides, a fifth electromagnet immediately adjacent the fourth electromagnet, and a sixth electromagnet immediately adjacent the fifth electromagnet, with the first electromagnet opposite the fourth electromagnet, the second electromagnet opposite the fifth electromagnet, and the third electromagnet opposite the sixth electromagnet, the remaining features are not in the prior art.

The prior art (and particularly JP '518) does not teach or suggest said single-phase AC current power supply is connected to each coil of said first through sixth electromagnet and configured to supply a single-phase AC current to each of said coils such that phase difference between every coil and the immediately adjacent coil  $0^\circ$  or  $180^\circ$ .

As to claim 22, the prior art does not teach or suggest the combination of 1) the coil of the first electromagnet and the coil of the fourth electromagnet are wound in the same first direction (x, x), 2) the coil of the second electromagnet and the coil of the fifth electromagnet are wound in the same second direction (y, y), the first direction being opposite to the second direction, 3) the coil of the third electromagnet and the coil of the sixth electromagnet are wound in the same first direction (x, x), where the single-phase AC current supplied from said single-phase AC current power supply to each of the coils of

said first through sixth electromagnets develops magnetic forces between every two electromagnets arranged adjacent to each other on the same side that are reversed in direction repeatedly over time to inducing only vibrating flows (10) in a direction of longitudinal width of the mold.

As to claim 23, the prior art does not teach or suggest the combination of 1) the coils of the first through third electromagnets are wound in the same first direction (x, x, x), and 2) the coils of the fourth through sixth electromagnets are wound in the same second direction (y, y, y), the first direction being opposite to the second direction, where the single-phase AC current supplied from said single-phase AC current power supply to each of the coils of said first through sixth electromagnets develops magnetic forces between every two electromagnets arranged opposite to each other on different sides of the mold that are reversed in direction repeatedly over time to inducing only vibrating flows (20) in a direction of transverse to a width of the mold.

Reconsideration and allowance of all the pending claims are respectfully requested.

Applicants believe that the present application is in condition for allowance and an early indication of the same is respectfully requested.

The Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 25-0120 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17.

Respectfully submitted,

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